CHAPTER 6

TRANSPORTATION FACILITIES

6-1. General. Railroad operations allow for the efficient movement of large, bulky items and provide for economical movement of large quantities of goods by a minimum number of operating personnel. During times of mobilization, the majority of breakbulk cargo will travel to and from depots by rail. Therefore, depots must contain adequate provisions for movement of material by rail. Design of rail oads will be in conformance with EM 1110-3-152.

6-2. Planning requirements.

a. Components. It will be necessary to design railroad facilities that will move freight from the main line of the serving railroad to warehouses and open storage locations within the depot. These facilities should include: access lines, sidings and spur tracks, receiving tracks, classification tracks, departure tracks, tracks to warehouse, open storage areas, and material loading/unloading areas, as well as tail tracks, wyes when required, and tracks to engine house and maintenance facilities. Advantage should be taken of relatively level and well-drained sites in order to reduce the amount of earthwork.

b. Traffic. The planning of a yard or terminal layout involves an evaluation of traffic, operating, and strategic considerations. Terrain and traffic govern yard layouts to such an extent that there can be no standard layout. The operational parts of yards are used for receiving, storing, classification, and departure purposes, but setting aside separate areas (as distinguished from separate tracks) for these functions is the exception rather than the rule. (It is normal in very large yards only, and usually only in yards employing humps and complex switching and retarding equipment.) In addition to facilities necessary for repair of rolling stock and leads adequate to permit continuous switching without delaying other traffic, most yards need only one arrangement of ladders and parallel yard tracks.

6-3. Trackage requirements.

a. Access lines. Access lines will extend from the serving railroad to the boundary of the depot. Construction of access lines during the early portion of the construction phase of a depot will provide a means of transporting construction materials to the site. If the length of the access track is greater than 5 miles, either dual tracks or single track with passing siding should be constructed.

b. Receiving tracks. Receiving tracks are used to accept the rail shipment onto the depot and to separate cars for processing in the classification yard. The number of receiving tracks required is determined by the anticipated density of inbound traffic under

worst-case conditions and the rate at which cars can be classified. The length of receiving tracks should be long enough to accommodate the maximum length train. These tracks should have direct access to the engine house. They may be connected to, or considered part of, the classification tracks. As a means of testing air breaks, compressed air lines should be installed in receiving tracks.

c. Classification tracks. Classification tracks are provided for the sorting and forwarding of cars to storage areas and warehouses. They are also used to collect and assemble cars that are prepared for shipment from the depot. The length and number of tracks necessary for a classification yard are dependent upon the number of classifications and the rate of train departures from the yard. Several short classification tracks are more efficient than a few long ones. The classification yard should be double-ended wherever possible.

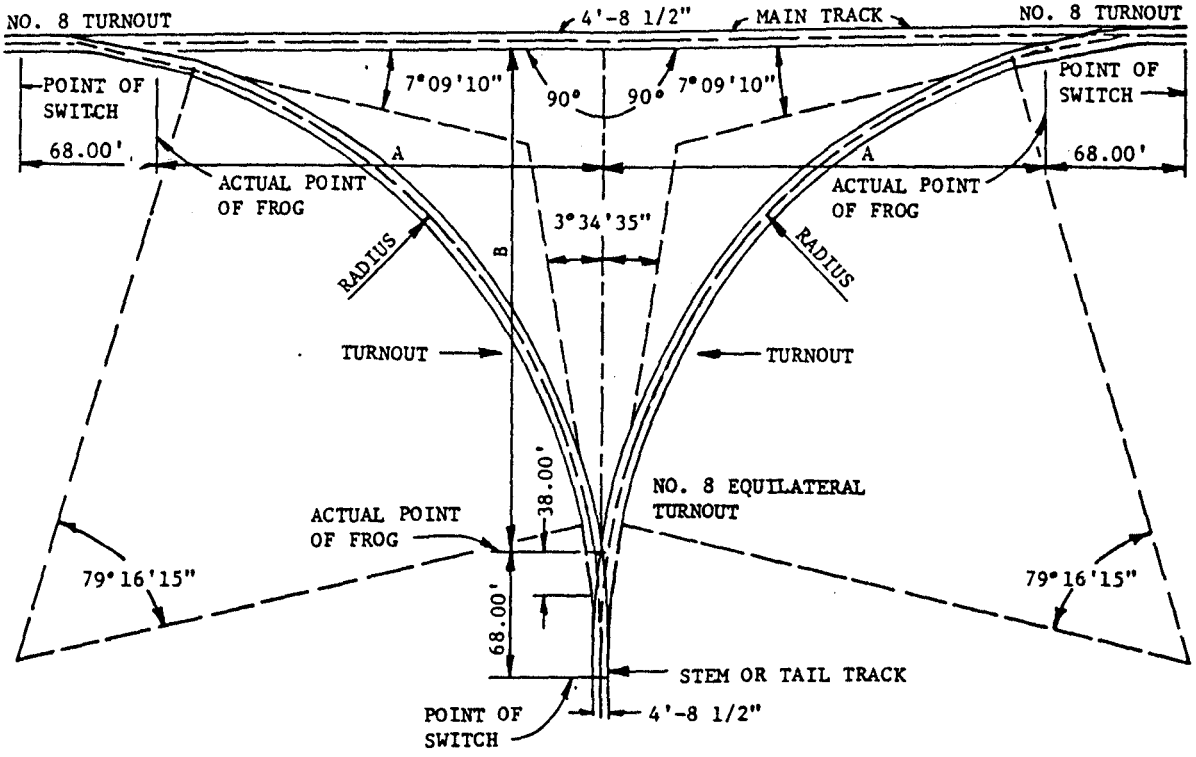
d. Departure tracks. Departure tracks are designed on the same principles as receiving tracks, and accommodate trains for inspection, air test, and attaching of locomotive and caboose prior to departure. Army trains may be run directly from the classification tracks, omitting departure tracks if provisions are made for car break testing. The receiving tracks can also double as departure tracks. The number of tracks is based on rate of classification and train departures. The length is a function of train length and available space.

e. Track to warehouses and storage areas. Tracks to warehouse and storage areas should lead away from the classification yard and serve every warehouse and open storage area where goods carried by rail may go. The space between parallel warehouses (on the track side) will be sufficient for two house tracks, a third track to facilitate switching operations, and a 12-foot-wide single road. Track layouts between the warehouse will provide a connection at only one end of the warehouse area except where terrain or operating conditions require a double-end connection. At all single-end lines, bumpers will be constructed to prevent trains from leaving the end of the track. For open storage areas, there will be at least one track running through the storage area with the required number of platforms to load and unload cars.

f. Wyes and rail track. Wyes are track layouts that are used in lieu of turntables for turning of cars and locomotives. They consist of the main track, two turnouts, and a stem or rail track, as shown in figure 6-1. In depot operations the tail track is made long enough to accommodate a locomotive and between 10 and 20 cars.

6-4. Signals and crossings.

a. Signals. Signal location should stress safety in high hazard areas. Design layouts should attempt to separate all rail traffic from civilian or Army vehicular or pedestrian traffic wherever it is possible. For example, administrative areas of the depot should be



CURVE DATA		
DEGREE OF CURVE	16°00'	9°30'
RADIUS	359.27	603.81
△	79°16'15"	79°16'15"
TANGENT	297.59'	500.14'
EXTERNAL	107.24'	180.24'
LENGTH	497.06'	834.23'

DEGREE OF CURVE	RADIUS	A	B
16°00'	359.27'	321.30'	342.01'
9°30'	603.81	534.92	569.40

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FIGURE 6-1. TYPICAL DESIGN OF WYE TRACKAGE

planned such that there are no rail lines crossing roads between the vehicular entrances to the depot and the final destination of these vehicles at administrative parking lots. This will eliminate the need for warning signals for daily traffic to and from the depot. If such a design cannot be planned, use of signals may be considered necessary. Within the warehouse area where rail lines cross roads between warehouses, signals are not considered necessary since it is a normal hazard to watch for moving freight cars, and yard speed limits will provide ample time for a potentially dangerous crossing to be avoided.

b. Crossing. Crossing surfaces must be as smooth as possible, and the materials selected for this purpose must be suitable for the type of traffic using the crossing. Although it may be desirable to match the material and texture of approach pavements, consideration must be given to a material and an installation that is economical to maintain and which will have a 5-year service life. Materials such as portland cement concrete or bituminous concrete are economical to install, but are costly to remove and replace. Wood plank and prefabricated materials may cost more to install, but are removable and reusable and therefore are more economical to use in the long run. Further, because they are easily removed and replaced, they facilitate the inspection of the track. Materials suitable for crossings are: bituminous concrete, portland cement concrete, precast concrete planks, wood planks, prefabricated rubber planks, modular plastic crossings, used rail, two-component epoxy, and rubber.

6-5. Engine shelter. The engine shelter should be a building designed for the purpose of housing and for conducting repair and maintenance to the depot locomotives. The engine shelter should be located close to the classification yard. This facilitates movement of the engine to and from the yard where most of its daily activity occurs. The engine shelter will be served by the number of tracks necessary to accommodate the number of locomotives utilized at the depot. The service facilities described below should line the engine shelter tracks.

6-6. Service facilities. Service facilities should be laid out so the servicing operations can be performed in proper sequence as the locomotive moves through the terminal. The usual relation of operations and facilities is: (a) inspection at inspection pits or platforms; (b) lubrication (oil and grease service during inspection); (c) sand, diesel oil, and water at appropriate facilties; (d) running repairs at engine house; (e) outbound movement at the ready track and wye. All facilities used before entering the engine shelter should be placed on the inbound lead, as in figure 6-2.

a. Water requirements. Diesel locomotives require engine-cooling water and water to supply steam heating systems, if used. This facility should be provided at the engine terminal. The quantity required per locomotive will be between 100 and 200 gallons. A supply facility is shown in figure 6-3.

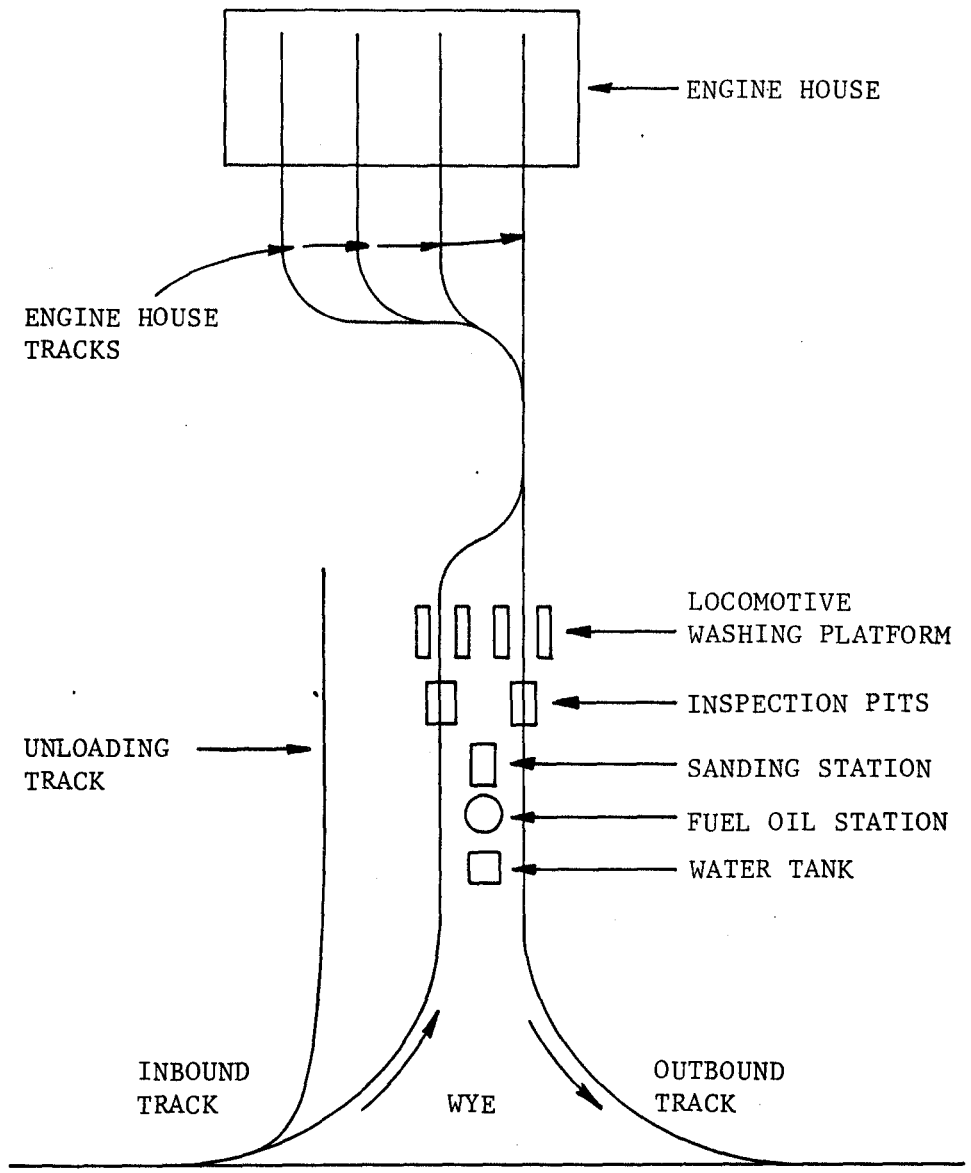

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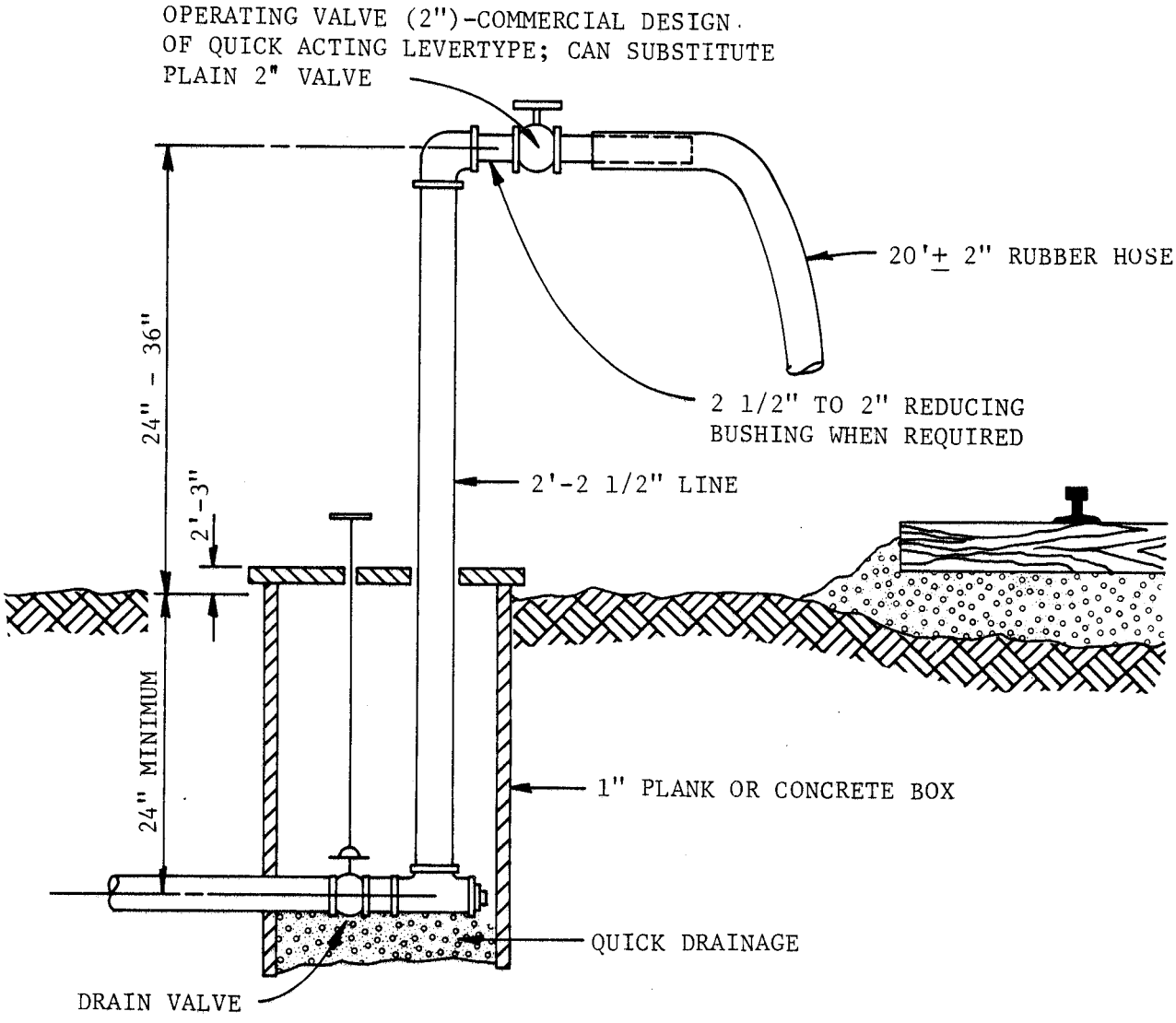
FIGURE 6-2. SERVICE FACILITIES FOR DIESEL LOCOMOTIVES



NOTE: HOSE CONNECTION CAN BE TAKEN FROM ELEVATED STORAGE TANK, INSTEAD OF FROM UNDERGROUND SUPPLY LINE.

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FIGURE 6-3. DIESEL LOCOMOTIVE WATER FACILITY

b. Fuel oil station. Diesel fuel oil should be stored in tanks placed high enough to permit fueling by gravity. If elevated tracks are available, the tank can be gravity filled from a tank car; otherwise, the oil must be pumped into the storage tank or forced out by compressed air. An earth dike should be built around the tank to form an impounding reservoir with a capacity greater than that of the tank. This earth-dike reservoir contains the oil and prevents fire or spread of fire in case the tank is damaged or destroyed. For fueling diesel engines, the nozzle on the fuel hose should be of a size and type that will not fit a water-intake opening, and vice versa, to avoid the accidental placing of water in the fuel tank or fuel in the water tank.

c. Sanding facilities. Sanding facilities are placed adjacent to the fueling station so that sand and fuel may be taken at the same time. Each terminal must be able to provide sufficient sand for all locomotives serviced there. Facilities must provide for unloading, storing, and drying of green sand and for the storage and delivery of dry sand. A fine, sharp, dry sand is required for locomotive traction or breaking ability. Sand may be placed in the locomotive by hand or by gravity from a tank placed at a higher level than the locomotive itself. The tank is filled by hand, clamshell, or compressed air. Where low temperatures are anticipated, steam coils are placed in the tank to improve flowability. Diesel locomotives have a capacity for 16 cubic feet. The rate of use and spacing of sand stations will be a function of gradients, train load, and number of stops made.

d. Inspection pits. For purposes of inspecting the underside of locomotives, an inspection pit is needed on the inbound track to the engine shelter. Figure 6-4 shows details of a concrete inspection pit; the drain is for removing collecting water from the pit.

e. Rail car facilities. The car shop, when required, will consist of a series of tracks designed to facilitate light repairs to cars. Tracks are laid in pairs spaced 18 feet center to center, with each pair separated 24 feet between adjacent track centers to provide material handling and storage space. The length and number of tracks will depend upon the anticipated amount of rail car repair. A machine shop may also be considered necessary to facilitate repairs to rail cars. The rail car shop and machine shop should be located close to the engine shelter so that the machine shop can be used for that facility also.

6-7. Yardmaster's office. Direction of rail activities for the depot occurs at the yardmaster's office. The yardmaster's office should be located on or close to the classification yard and may be a one- or two-story building, depending upon the size of the depot classification yard. If the structure is a two-story building, the top story should contain the operations room (block station) where direction of yard activities can be controlled from a better vantage point. This

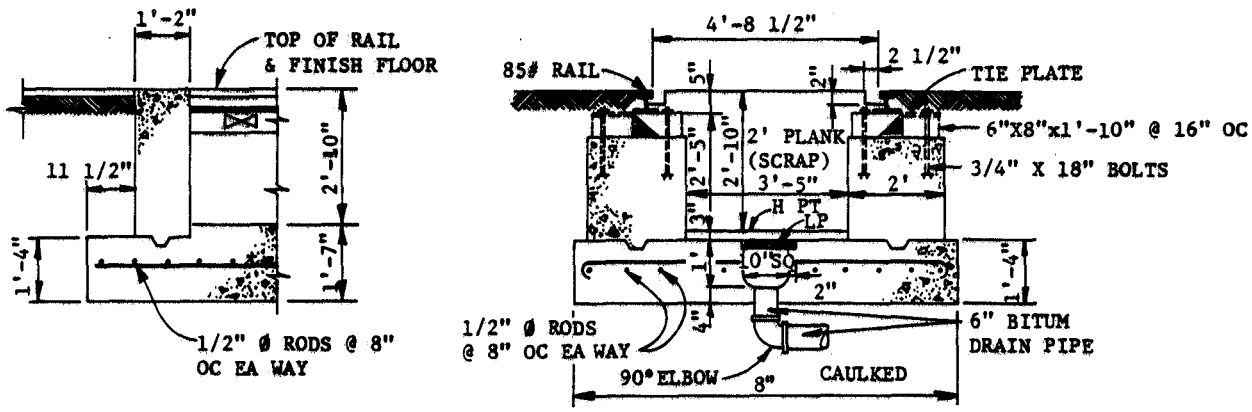

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FIGURE 6-4. CONCRETE INSPECTION PIT

facility may contain automatic switching equipment, signal controls, and radio equipment for directing remote operations.

6-8. Truck facilities. While railroad operations require more support facilities for efficient depot operation, most movement of goods around the depot will be by commercial and yard-type trucks. A fueling point, very similar to a gasoline station, will be required. They will need to be maintained and repaired by the depot motor pool, which is a post engineer facility. The yard cab storage area should be located near the maintenance and repair shops. It should be at minimum a covered, improved surface where cabs not being used can be stored.